Introducing the Indoor Maps Program

Yuval Kossovsky, Indoor Maps Program
Consumer or Enterprise App

Apple Maps
Indoor Mapping Data Format

Overview

Indoor Mapping Data Format (referred to throughout this document as "IMDF") provides a generalized, yet comprehensive model for any indoor location, providing a basis for orientation, navigation, and discovery. In this release, there are also detailed instructions for modeling the spaces of an airport and a shopping mall.

Developers can access both text and visual examples of all features, along with clear explanations of all terms. IMDF conforms to RFC 7946, ensuring compatibility and transferability of the data. IMDF is lightweight, mobile-friendly, and can be rendered on any device, OS, or browser.

For GIS and BIM specialists, there is support for IMDF in many of your favorite tools.

IMDF is used by Apple to provide Indoor Positioning support with Core Location. Indoor maps integrated with indoor positioning can establish the foundation for a wide range of consumer and enterprise location-based apps and websites.

IMDF Terms of Use

Questions about the spec? imdfquestions@apple.com

Specification
Building Owner
Building Owner ➔ Create IMDF
Integrate with Your App and Website

Create IMDF

Building Owner

Integrate with Your App and Website
Building
Owner
Join the Indoor Maps Program

Building Owner
Join the Indoor Maps Program

Create IMDF

Building Owner
Join the Indoor Maps Program

Create IMDF

Validate IMDF

Building Owner

Enable Indoor Positioning
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Integrate with Your App and Website

Enable Indoor Positioning
Join the Indoor Maps Program → Create IMDF → Validate IMDF → Enable Indoor Positioning → Integrate with Your App and Website → Display in Apple Maps
Join the Indoor Maps Program

Create IMDF

Integrate with Your App and Website

Validate IMDF

Enable Indoor Positioning

Building Owner
Indoor Maps

Easily create detailed maps of your indoor spaces and let visitors see where they are right in your app. Organizations with large public and private spaces like airports, shopping centers, arenas, hospitals, universities, and private office buildings can register for the Indoor Maps Program. Indoor maps are built using industry standard tools and require only your existing Wi-Fi network to enable GPS-level location accuracy so visitors can navigate your spaces with ease.

Create standards-based indoor maps

Indoor Mapping Data Format (IMDF) provides a generalized, yet comprehensive data model for any indoor location, creating a basis for orientation, navigation and discovery. IMDF is output as an archive of GeoJSON files. We also provide an easy to use IMDF Sandbox so anyone can view and make minor edits to their IMDF.

Enable indoor positioning

Apple’s indoor positioning technology passively uses your existing Wi-Fi infrastructure and requires no additional hardware deployment. This technology achieves GPS-level accuracy in indoor spaces by using the radio frequency (RF) patterns of your Wi-Fi access points. After creating an indoor map using IMDF, simply perform an RF survey of your spaces using Apple’s Indoor Survey app to enable this indoor positioning.

Indoor Maps Program

Get started

Indoor Maps

Learn more

Indoor Maps Program

Also available

Apple’s MapKit and MapKit JS APIs include support for GeoJSON rendering and overlays, so you can use your IMDF files to create stunning Indoor Maps in your own apps and websites. Whether for consumers or for a limited audience, IMDF provides richly detailed indoor guidance with the user location “blue dot” functionality.

Integrate with your app and website

The Indoor Maps Program is appropriate for the owners or operators of almost any large public or private venue. Apple does not charge fees for registration, for use of IMDF, or to use the indoor positioning service. Read the program documentation and learn about our partners. Please check with your facilities team to see how you can create your own beautiful indoor maps using IMDF.

If you have questions about the Indoor Maps Program, please email indoor@apple.com.

Introducing the Indoor Maps Program

WWDC 2019

MapKit

MapKit JS

Learn more

Indoor Maps

Empower your patients with Health Records on iPhone

EHR Gateways

Learn more

Businesses on Maps

Add or update your business information in Apple Maps

Let your customers chat with you through the Messages App

Business Accounts for Messages
Indoor Maps

Enable your customers to find locations, services, and shops inside the public areas of your property.

Add the "blue-dot" to the indoor maps inside your consumer or enterprise iOS apps.
Indoor Maps

Enable your customers to find locations, services, and shops inside the public areas of your property.

Add the “blue-dot” to the indoor maps inside your consumer or enterprise iOS apps.

Apply
Connected Services

- Indoor Maps Program
  - Indoor Maps

- Organization
- Team Members
No team member selected
Invite a team member

Choose which type of team member to invite

- Individual
  Invite a single person to join this organization

- Organization
  Invite another organization to join

Cancel

Next
### Alexis Kay

#### Roles and Permissions

<table>
<thead>
<tr>
<th>Choose access privileges</th>
<th>Selected roles (5)</th>
</tr>
</thead>
<tbody>
<tr>
<td>No access privileges</td>
<td>Administrator</td>
</tr>
<tr>
<td></td>
<td>Reader</td>
</tr>
<tr>
<td></td>
<td>Team Members - HR Administrator</td>
</tr>
<tr>
<td></td>
<td>Indoor Maps - Map Maker</td>
</tr>
<tr>
<td></td>
<td>Indoor Maps - Surveyor</td>
</tr>
</tbody>
</table>

- **Administrator**
  - Full organization permissions
- **Reader**
  - Can view all profiles and service accounts
- **Team Members - HR Administrator**
  - Can view and edit team members
- **Indoor Maps - Map Maker**
  - Can view and upload Indoor Maps
- **Indoor Maps - Surveyor**
  - Can read Indoor Maps and access Survey app

---

**Register**

[register.apple.com/indoor]
Alexis Kay

Venue Permissions

Choose venues

- All organization venues
  This team member will have access to all venues your organization has

- Custom venues
  This team member will have access to custom chosen venues

Search for venues...

Selected venues (1)

Victoria International Airport
1640 Electra Blvd, Sidney

Administrative Building 1
1640 Electra Blvd, Sidney

Administrative Building 2
1640 Electra Blvd, Sidney

Cancel

Next
Claim your location

This building can be enabled with Apple Indoor Positioning using an IMDF your organization creates. The indoor map for this property is eligible for display in Apple Maps.

Location Details

LOCATION

Victoria International Airport
201-1640 Electra Blvd, Sidney

Apple has permission to add my indoor maps to Apple Maps

- [ ] No
- [x] Yes

Request approval
Join the Indoor Maps Program
Best practices
Join the Indoor Maps Program

Best practices

For large buildings, public or private
Join the Indoor Maps Program
Best practices

For large buildings, public or private

Enrollment includes organization verification
Join the Indoor Maps Program

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Organization controls member access
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Display IMDF using MapKit and MapKit JS
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Display IMDF using MapKit and MapKit JS

IMDF is used to enable indoor positioning

Use GIS, BIM and other tools to create IMDF
Create IMDF

Join the Indoor Maps Program

Integrate with Your App and Website

Validate IMDF

Building Owner

Enable Indoor Positioning
Indoor Map

- Exhibit Hall
- Dinoshop
- Jurassic Table
Indoor Map
Indoor Map
Indoor Map

Building Footprint:

- Coordinates:
  - Top Left: 37.3277, -121.8897
  - Top Right: 37.3294, -121.8910
  - Bottom Left: 37.3294, -121.8869
  - Bottom Right: 37.3306, 121.8884
Indoor Map

Building Footprint

Level

Units
Indoor Map

- Building Footprint
- Level
- Units
- Openings
Layer Hierarchy

manifest  address  venue
Layer Hierarchy

manifest  address  venue  building
Layer Hierarchy

manifest | address | venue | building
Layer Hierarchy

manifest → address → venue → building → footprint
Layer Hierarchy

manifest → address → venue → building → footprint
Layer Hierarchy

- manifest
- address
- venue

- building
  - level
    - unit
  - footprint
Layer Hierarchy

manifest | address | venue -> building -> footprint

geofence | section | opening -> level

unit
Layer Hierarchy

manifest -> address -> venue -> building -> footprint

level:
- geofence
- section
- opening
- unit
Layer Hierarchy

manifest  address  venue

building

footprint

level

gEOFence  section  opening

unit

kiosk
Layer Hierarchy

manifest | address | venue

building

footprint

gEOFence | section | Opening

level

unit

amenity

kiosk | fixture
Layer Hierarchy

manifest  address  venue

building

footprint

level

geofence  section  opening

unit

amenity  anchor

kiosk  fixture
"type" : "Feature",
"id" : "139c9194-36d7-424c-9fd0-5524c2d9406f",
"feature_type" : "level",
"properties" : {
    "category" : "unspecified",
    "restriction" : null,
    "outdoor" : false,
    "ordinal" : 0,
    "name" : { "en" : "Level 1" },
    "short_name" : { "en" : "L1" },
    "display_point" : { "type" : "Point", "coordinates" : [ -123.4304617, 48.640636 ] },
    "address_id" : null,
    "building_ids" : [ "0c36de8f-dcee-4c48-b011-2c27c7f55933" ]
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"geometry" : { "type" : "Polygon", "coordinates" : [ [ [ -123.4293921, 48.6406522 ], ... ] ] }
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Create IMDF

Best practices
Create IMDF

Best practices

Understand the element hierarchy
Create IMDF
Best practices

Understand the element hierarchy

Ensure IMDF is complete and covers building
Create IMDF
Best practices

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Levels must be covered entirely by units
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Use notable structures for positioning survey
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Validate IMDF

Integrate with Your App and Website

Enable Indoor Positioning

Building Owner
Demo
Fixing your data
Victoria International Airport
Sidney, CA

Terminals  Levels  Businesses
1        3               14

Fixes During File Import

IMDF File Validation
601 Passes, 3 Errors, 31 Warnings

Review
Victoria International Airport
Sidney, CA

Terminals: 1
Levels: 3
Businesses: 14

Fixes During File Import

IMDF File Validation
601 Passes, 3 Errors, 31 Warnings

Review
Units Must Not Overlap

For more information about this validation, please visit the IMDF Validations Reference.

- Two units overlap here.

To fix this, you need to remove the overlapping area from one of them.

- Blue Unit
  - Baggage Pickup Domestic
    - Level 1
  - Remove from blue unit

- Yellow Unit
  - Baggage Pickup International/Domestic
    - Level 1
  - Remove from yellow unit

Baggage Pickup Domestic
Oversize Baggage Claim Area
**Units Must Not Overlap**

For more information about this validation, please visit the IMDF Validations Reference.

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**Blue Unit**

- Baggage Pickup Domestic
- Baggage Pickup Domestic

Remove from blue unit

**Yellow Unit**

- Baggage Pickup International/Domestic
- Baggage Pickup Domestic

Remove from yellow unit
Units Must Not Overlap

This level has areas where units overlap.

For more information about this validation, please visit the IMDF Validations Reference.
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All Issues

Errors

Unit Must Be Within Referenced Level

1
All Issues

<table>
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</tr>
</thead>
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</tr>
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Unit Must Be Within Referenced Level

For more information about this validation, please visit the IMDF Validations Reference.

- Unit extends outside the level

To fix this, either remove the part of the unit that extends outside the level, or expand the level to cover this area.

- Unit
  - Structure Unit
    - Level 1
  - Remove the area outside the level

- Referenced Level
  - Level 1
    - Level 1
  - Expand level to cover the area
Unit Must Be Within Referenced Level

For more information about this validation, please visit the IMDF Validations Reference.

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Electronically checks accuracy of IMDF
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Geo-referencing and manual check
Validate IMDF

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Easily visualize an IMDF archive
Validate IMDF
Best practices

- Electronically checks accuracy of IMDF
- Geo-referencing and manual check
- Easily visualize an IMDF archive
- Investigate and fix simple issues
Validate IMDF
Best practices

Electronically checks accuracy of IMDF
Geo-referencing and manual check
Easily visualize an IMDF archive
Investigate and fix simple issues
Export fixed IMDF
Validate IMDF

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Integrate with Your App and Website

Enable Indoor Positioning

Building Owner
Join the Indoor Maps Program → Create IMDF → Validate IMDF → Enable Indoor Positioning

Integrate with your App and Website → Join the Indoor Maps Program

Building Owner
IMDF + WiFi =
Indoor Survey App
Indoor Survey App

Collect WiFi in your buildings using survey app
Indoor Survey App

Collect WiFi in your buildings using survey app
Upload the surveys for analysis and activation
Indoor Survey App

Collect WiFi in your buildings using survey app
Upload the surveys for analysis and activation
Test indoor positioning for accuracy
Demo
Surveying for Indoor Positioning
Move the map to your location, and tap the target to add your starting waypoint.
Roughly every 5 meters, move the map to your location, and add a waypoint.
Roughly every 5 meters, move the map to your location, and add a waypoint.
Demo
Testing Indoor Positioning
Indoor Positioning

Walk the venue and test positioning. If you find an issue, survey the affected area again.
Indoor Positioning

Walk the venue and test positioning. If you find an issue, survey the affected area again.
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Walk the venue and test positioning. If you find an issue, survey the affected area again.
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Walk the venue and test positioning. If you find an issue, survey the affected area again.
Enable Indoor Positioning

Best practices
Enable Indoor Positioning
Best practices

WiFi fingerprinting, no impact to network
Enable Indoor Positioning

Best practices

WiFi fingerprinting, no impact to network

Enabled using IMDF and indoor survey app
Enable Indoor Positioning
Best practices

WiFi fingerprinting, no impact to network

Enabled using IMDF and indoor survey app

Survey is simple to do, but steps are specific
Enable Indoor Positioning
Best practices

WiFi fingerprinting, no impact to network

Enabled using IMDF and indoor survey app

Survey is simple to do, but steps are specific

Use the same model of iPhone and iOS
Enable Indoor Positioning

Best practices

WiFi fingerprinting, no impact to network

Enabled using IMDF and indoor survey app

Survey is simple to do, but steps are specific

Use the same model of iPhone and iOS

Keep in center of walkways and away from walls
Enable Indoor Positioning
Best practices

WiFi fingerprinting, no impact to network
Enabled using IMDF and indoor survey app
Survey is simple to do, but steps are specific
Use the same model of iPhone and iOS
Keep in center of walkways and away from walls
Avoid cases that can attenuate the WiFi signal
Enable Indoor Positioning

Best practices

WiFi fingerprinting, no impact to network

Enabled using IMDF and indoor survey app

Survey is simple to do, but steps are specific

Use the same model of iPhone and iOS

Keep in center of walkways and away from walls

Avoid cases that can attenuate the WiFi signal

Read the help documentation
Join the Indoor Maps Program

Create IMDF

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Building Owner
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Create IMDF

Validate IMDF

Enable Indoor Positioning

Integrate with Your App and Website

Building Owner
Integrate with Your App and Website

MapKit Render GeoJSON as overlays and annotations
Integrate with Your App and Website

MapKit Render GeoJSON as overlays and annotations

Style your indoor maps elements
Integrate with Your App and Website

MapKit Render GeoJSON as overlays and annotations

Style your indoor maps elements

Display user location indoors
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More Information

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